____ BATCHING

a. General. - The Contractor shall notify the Contracting Officer before batching concrete. Unless inspection is waived in each case, batching shall be performed only in the presence of a duly authorized Government inspector.

The Contractor shall provide equipment and shall maintain and operate the equipment as required to accurately determine and control the prescribed amounts of the various materials entering the concrete mixers. The amounts of bulk cement, [1](pozzolan,) sand, and each size of coarse aggregate entering each batch of concrete shall be determined by individual weighing. Sand and coarse aggregate may be weighed with separate scales and hoppers or cumulatively with one scale and hopper. [1](If the batch plant is equipped with automatic interlocking sequential batching controls, the cement and pozzolan may be weighed cumulatively with one scale and hopper so long as weighing is automatically controlled within the specified tolerances and cement is weighed first. If the batch plant is not so equipped, cement and pozzolan shall be weighed separately with individual scales and hoppers.) [2](Cement shall be weighed separately with an individual scale and hopper.) Water and admixtures shall be measured by weight or by volume in accordance with this paragraph and paragraph ___ (Admixtures.) Where bagged cement is used, it need not be weighed if the concrete is proportioned on the basis of integral bags of cement.

[3](Aggregate will be rejected if it contains particles frozen together. During freezing weather, the Contractor shall protect aggregate stockpiles containing free water by covering and heating them, or shall screen out frozen material prior to use, or shall do both to prevent or remove frozen particles.)

When bulk [2](cement) [1](cementitious materials) and aggregates are dry batched and hauled to where mixing is accomplished, each batch shall be protected during transit to prevent loss and to limit prehydration of the [2](cement) [1](cementitious materials). Separate compartments with suitable covers shall be provided to protect the [2](cement) [1](cementitious materials) or [2](it) [1](they) shall be completely enfolded in and covered by the aggregates to prevent wind loss. If [2](cement is) [1](cementitious materials are) enfolded in moist aggregates or otherwise exposed to moisture and delays occur between batching and mixing, the Contractor shall, at his own expense, add extra [2](cement) [1](cementitious materials) to each batch in accordance with the schedule in table ___ [Additional [2](cement) [1](cementitious materials) requirements].

Table ___. - Additional [2](cement) [1](cementitious material requirements

[1](Hours of contact between cementitious materials and wet aggregate) [2](Hours of contact between cement and wet aggregate)	**Additional [2](cement) [1](cementitious materials) required**
0 to 2	0 percent
2 to 3	5 percent
3 to 4	10 percent
4 to 5	15 percent
5 to 6	20 percent
Over 6	Batch will be rejected

* The Government reserves the right to require the addition of [2](cement) [1](cementitious materials) for shorter periods of contact during periods of hot weather and the Contractor shall be entitled to no additional compensation by reason of the shortened period of contact.

b. Equipment. -

(1) All weighing and measuring equipment shall be accurate to 0.40 percent over the working range. In addition, the construction and accuracy of equipment shall conform to the applicable requirements of the National Bureau of Standards Handbook 44, Specifications, Tolerances, and Other Technical Requirements for Commercial Weighing and Measuring Devices. [4](The Contractor shall schedule and perform monthly static tests to assure that the operating performance of each scale and measuring device is within the 0.40-percent accuracy and shall provide standard test weights and any other equipment necessary to conduct these tests. The tests shall be made in the presence of a Government inspector and shall be subject to his approval. In addition to monthly tests, the Contractor shall perform additional tests when requested by the Government.) The Contractor shall make such adjustments, repairs, or replacements as may be necessary to meet the specified requirements for accuracy of measurement.

(2) Each weighing unit shall be springless and shall visibly register the actual weights during the weighing operation and not just indicate when a prescribed weight has been obtained. The clear interval for dial scale graduations shall be not less than 0.03 inch. Each scale graduation shall indicate increments no greater than 2.5 pounds for water and [2](cement) [1](cementitious materials), and no more than 10 pounds for aggregate for each

cubic yard normally batched. Each batch weight indicator and volumetric dispenser shall be in full view of the operator. Batching controls shall be interlocked so that a new batch cannot be started until the weighing hoppers have been completely emptied of the last batch and the scales register zero weight.

(3) The equipment shall be capable of controlling the delivery of material so that the combined inaccuracies in feeding and measuring during normal operation will not exceed by individual weight plus or minus 1 percent for water; plus or minus 1-1/2 percent [2](for cement) [1](for cementitious materials); plus or minus 2 percent each for sand, 3/4-inch nominal maximum-size aggregate, and 1-1/2-inch nominal maximum-size aggregate; and plus or minus 3 percent for admixtures [5](and 3-inch nominal maximum-size aggregate). The weighing hoppers shall be constructed so as to permit removal of materials batched in excess of the prescribed mix design and the above tolerances.

(4) Measuring devices for air-entraining and chemical admixtures shall have sufficient capacity to measure at one time the full quantity of the properly diluted solution required for each batch, and shall be maintained in a clean and freely operating condition. If admixtures are measured by a method other than direct weighing, equipment shall be designed for confirmation of the accuracy of each batch quantity by use of visual-mechanical gauges readily visible from the batch plant operator's station. Admixture batching equipment shall be constructed so that the required batch quantity can only be added once to each batch, and so that each admixture is discharged separately into the batched mixing water as it is being discharged into the mixer.

(5) Equipment for conveying batched materials from weighing hoppers into the mixer shall be constructed, maintained, and operated so as to prevent spillage of the batched materials and overlap of batches.

(6) Equipment for handling [2](cement) [1](cementitious materials) in the batching plant shall be constructed and operated so as to prevent noticeable dust during the measuring and discharging of each batch of material.

(7) Aggregate batch bins shall be so constructed as to be selfcleaning during drawdown.

(8) Coarse aggregate shall be deposited in the batch bins directly over the discharge gates. [5][Aggregate larger than 3/4-inch nominal size shall be deposited in the batch bins through effective rock ladders, unless the Contractor can prove to the Contracting Officer's satisfaction that the aggregate will not be subject to breakage and degradation beyond the limits allowable in the specifications as provided in table ____ (Percentages of deleterious substances in coarse aggregate), paragraph ____ (Coarse Aggregate), and table ____ (Coarse aggregate grading requirements), paragraph ____ (Coarse Aggregate).]

(9) Convenient facilities shall be provided for readily and safely obtaining representative samples of [2](cement) [1](cementitious materials), admixtures, sand, and each size of coarse

aggregate from the discharge stream between batch bins and the weighing hoppers or between the batch hopper and the mixer.

(10) The water batching device shall be constructed so that the water will be discharged quickly and freely into the mixer without objectionable dribble from the end of the discharge pipe, and shall be such that leakage will not occur when the valves are closed. In addition, equipment shall be capable of adjusting batch water by as little as 3 pounds per cubic yard and there shall be a means for accurately introducing small increments of water into each mixer after batching for occasional final tempering of the concrete.

(11) The equipment shall be capable of adjustment to compensate for the varying moisture content of the sand and coarse aggregates and to adjust the mix proportions as needed.

(12) The Contractor shall inform a Government batch plant inspector prior to and after changes and adjustments in batching equipment and control instrumentation.

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[1]Delete when concrete standard, Conc. 2, Cement, is used.
[2]Delete when concrete standard, Conc. 3, Cementitious Materials, is used.
[3]Delete in areas not likely to have extended periods of freezing.
[4]Delete when less than 5,000 cubic yards are required for construction.
[5]Delete if maximum size aggregate is 1-1/2 inches or less.

3-15-85 Revisions: Revised throughout.